

SUBJECT INDEX

A

A stars, 68, 445–46
Abell 30, 97, 102, 106–7, 110
Abell 78, 97, 106–7, 110
Abundances
in Crab Nebula, 125–32, 137, 142
in gaseous nebulae, 351, 356
in globular clusters, 356–57, 359
in H II regions, 348–55, 358–59, 366, 373
in halo stars, 225–38
interstellar, 339–44, 348–49, 366–67
in planetary nebulae and their nuclei, 94–97, 107, 110–11
in Population I stars, 359–62, 364–68, 373
in Population II stars, 337, 363–67, 369, 372–73
primordial, 319
observed, 337–70, 373
predicted, 326–31, 368–70, 373
in solar system, 344, 347–48, 358, 360, 362, 366
stellar, 337–39, 350, 357–68
ADS 4229, 62
ADS 6825, 62
ADS 10531, 62
ADS 11579, 62
ADS 12473, 62
AFGL 490, 274, 288
Aldebaran (α Tauri), 78–80
Algol (β Persei), 64
Alpha Aquilae, see Altair
Alpha Aurigae, see Capella
Alpha Canis Majoris, see Sirius
Alpha Canis Minoris, 343
Alpha Carinae, see Canopus
Alpha Centaurus A, 342
Alpha Herculis, 78
Alpha Orionis, see Betelgeuse
Alpha Scorpii, see Antares
Alpha Tauri, see Aldebaran
Alpha Virginis, 63–64, 72
Altair (α Aquilae), 77
AM064–741, 150
AM067–741, 150
AM Herculis, 220–22
Antares (α Scorpii), 79–80
Ap Stars, 418
94 Aquarii, 74
AR Lacertae, 424–25
AS 353, 308

Atmosphere
minimizing the image-degrading effects of, 44–51; see also Seeing
Atmospheric optics, 21–26
image quality in, 24–26
Aurorae, 11
A0136–0801, 154–55, 157

B

B stars
angular diameters of, 76–77
helium abundance in, 357–58
interstellar D lines in spectra of, 339–41, 344
X-ray emission from, 418–19, 426, 433, 445–46
Barium abundance in halo stars, 227, 236
BD–18°550, 235
BD+26°730, 389
Beta Capricorni, 73–74
Beta Cephei, 64
Beta Orionis, 77
Beta Persei, see Algol
Beta Scropii, 72–73
Betelgeuse (α Orionis), 77–78, 80
Big Bang model of the Universe, 228–29, 237, 319–31, 369–73
alternatives to, 332–37
Binaries, eclipsing, see Eclipsing binaries
Binary stars
effective temperatures of, 66, 72–77
interferometric measurements of, 60–65, 69–74, 82
magnitude differences in, 68–74
occultation measurements of, 60, 66–69, 72
Binary stars, close, 10
radio emission from, 217–22
X-ray emission from, 419
Binary stars, spectroscopic, 60–62, 65, 69, 71
double-lined, 61, 65, 69, 73
Binary stars, visual, 59–63, 65, 404
Bremstrahlung, 169–70, 174–76, 202, 209–10, 217, 222
BY Draconis variables, 379–80, 387–94, 407, 409
B 335, 311

C

Canopus (α Carinae), 339, 346
Capella (α Aurigae), 62–64, 70–71, 341–42, 437
Carbon stars, 362
Cartwheel nebula, 149–51
Cataclysmic variables, 414
CC Eridani, 389
Centaurus A, 162–64
Cepheid variables, 76
Cepheus A, 274, 287, 312
Chi Draconis, 73
Climate, affected by sunspot cycle, 252
Copernicus satellite, 339, 341
Corona, solar, see Solar corona
Coronae, stellar, see Stellar coronae
Cosmic rays, 252
Cosmic rays, galactic, 414, 443
spallation by, 363–67, 381
Cosmology, 225–38, 319–78;
see also Big Bang model of the Universe, Nucleosynthesis, Star formation
Cowling model, 8
Crab Nebula, 119–46
abundance in, 125–32, 137, 142
distance of, 119, 121
dust grains in, 130–31, 135, 143
emission-line spectrum of, 124–25, 142
filamentary structure of, 122–32, 138–39, 142–43
as gamma-ray source, 120, 123
infrared emission of, 120, 123, 130
interstellar extinction of, 121–23
“jet” extending from, 140–42
luminosity of, 122–24
mass of, 121–22, 124, 132–35, 142
optical observations of, 119–20, 124–25, 142–43
possible halo around, 139–40, 143
pre-SN star in, 134–35, 137–38, 141
pulsar in, 119–20, 124, 134–39, 141
mass of, 134–35
radio observations of, 119–20, 122, 139–41

- supernova event in, 134–39
 ultraviolet observations of,
 123–24, 127, 130–31,
 142
 as X-ray source, 119–20,
 122–23, 139–40
- D**
- Delta Orionis, 341
 Delta Scorpii, 362
 Deuterium
 observed abundances of, 337–
 46, 366–67, 373
 pre-solar abundance of, 345,
 347–50
 primordial abundance of, 325–
 28, 330–31, 337, 345–
 46, 366–67, 369, 372–73
- Diameters of stars, angular, see
 Stars, angular diameters of
- E**
- Eclipsing binaries
 activity cycles in, 390–91
 distances to, 76
 rotation-X-ray emission
 correlation in, 429
 Einstein Observatory satellite,
 212, 415–17, 426–27, 430,
 432, 436–37, 439, 443
 Epsilon Eridani, 342
 Epsilon Indi, 342
 Epsilon Persei, 339
 EQ Pegasus, 212
 ESO 474–G26, 154, 158
 Eta Orionis, 71
 Evolution of Galaxy, chemical,
 225–38, 337
 Evolution of planetary nebulae,
 90, 107–12
 EXOSAT, 416, 437, 439
- F**
- F stars
 activity cycles of, 394–405,
 441
 angular diameters of, 76
 F stars, dwarf
 helium abundance in, 357
 lithium abundance in, 360–61,
 365
 X-ray emission of, 418
 Flare stars, see Stellar flares
 FU Orionis stars, 270
- G**
- G stars, activity cycles of, 391,
 394–408
- G stars, dwarf
 lithium abundance in, 360–62,
 365
 X-ray emission of, 418, 432–
 33, 440
 Galactic winds in elliptical gal-
 axies, 162
 Galaxies, barred spiral, 152–53,
 165
 Galaxies, blue compact, 352–
 53
 Galaxies, cD, 147
 Galaxies, elliptical
 dust and gas in, 162–64
 ripples around, 159–60
 shells around, 147, 159–65
 Galaxies with outer rings, 148,
 151–53, 165
 Galaxies, polar ring, 164–65
 formation of, 155–58
 mass transfer in, 156
 Galaxies, ring, 147–51, 165
 classification of, 149
 evolution of, 151
 formation of, 147–50, 165
 frequency of, 148
 H II regions in, 151
 Galaxies, shells around, 147,
 159–65
 formation of, 160–62
 Galaxies, S0, 149, 165
 gas around, 158–59
 with outer rings, 151–53
 with polar rings, 154–59,
 164–65
 Galaxies, spiral, 149–50
 with outer rings, 151–53, 165
 Galaxy, halo of, chemical evolu-
 tion of, 225–38, 337
 Gamma Persei, 69–70
 Gamma² Velorum, 63, 72, 76
 Gamma-ray source, Crab Nebula
 as, 120, 123
 Gas theory, 6–7, 10
 Gaseous nebulae, 351–56
 Geomagnetic storms, 11–12, 15
 Globular clusters, 356–57, 359
 Gravity, alternate theories of,
 334–35
 Gum Nebula, 308–9
 Gyroresonance absorption, 176–
 77, 186, 191–92
 Gyroresonance emission, 176–
 78, 186, 202
 from thermal electrons, 177–
 78
 Gyrosynchrotron radiation, 170,
 172–74, 176–84, 206, 210,
 213, 219–20, 222
 from power-law electrons,
 180–82
 from thermal electrons, 178–
 80
- H**
- H II regions
 helium abundance in, 348–55,
 358–59, 366, 373
 in ring galaxies, 151
 Halo stars, abundances in, 226–
 38
 barium, 227, 236
 iron, 227–34
 iron-group, 234–35, 237
 light-element, 229–31, 237
 light-metal, 231–34, 237
 oxygen, 227, 229–31, 237
 rare-earth, 235
 yttrium, 236–37
- HD 10700, 402
 HD 16673, 402, 404–5
 HD 17925, 402–4
 HD 18256, 402
 HD 19445, 232
 HD 28363, 70
 HD 32147, 404
 HD 38268, 71–72
 HD 44179, 64
 HD 78366, 402
 HD 81809, 402
 HD 95735, 404
 HD 101501, 402, 407
 HD 103095, 232, 234,
 402
 HD 114710, 407
 HD 115404, 404
 HD 115444, 235
 HD 122563, 235–37
 HD 131156A&B, 404
 HD 134440, 232
 HD 140283, 232
 HD 152391, 402, 404
 HD 156026, 404
 HD 160346, 402, 405
 HD 161239, 402
 HD 165341A&B, 404
 HD 166620, 402
 HD 190007, 400, 404
 HD 190406, 402–5, 407–
 8
 HD 201091–2, 404–5
 HD 206860, 407
 HD 207978, 402
 HD 219834A&B, 404
 HEAO-1, 416, 427
 HEAO-2, see Einstein Observa-
 tory Satellite
 Helium
 observed abundances of, 351–
 59
 primordial abundance of, 326–
 31
³Helium
 evolution of, 349–50
 observed abundances of, 346–
 50, 366, 373

- primordial abundance of, 327–28, 330, 349–50, 366, 369
- H**
- Helium
observed abundances of, 350–59
- primordial abundance of, 327–31, 334, 350, 367, 369–70
- Herbig-Haro objects, 267, 270–71, 275, 301, 308, 313
- HH 1, 271, 308
- HH 2, 271, 308
- HH 7–11, 292
- HH 11, 271
- HH 12, 271
- HH 28, 271
- HH 29, 271
- HH 32, 271
- HH 46, 308
- HH 47, 308
- High angular resolution measurements, 59–87
of binary stars, 60–74
by interferometry, 59–66, 76–78, 81
by lunar occultations, 60, 66–69, 75, 78–80
by speckle interferometry, 60, 64–66, 77–78
infrared, 80–81
of stellar diameters, 74–80
- HIPPARCOS satellite, 64, 74
- HR 1099, 219, 343
- HR 1331, 70
- HR 1391, 70
- HR 1411, 70
- Hyades cluster
binaries in, 70
helium abundance of stars in, 357
lithium abundance of stars in, 360–61
luminosity variations in stars in, 394–95, 408
- X-ray emission of stars in, 430, 432–33
- I**
- IC 10–1, 353
- IC 10–2, 353
- IC 3568, 102
- Image-improving techniques, 21, 44–51
deformable optical components, 50–51
- interferometers, 47–50
modifications to telescopes, 45
- reconstruction, 46
speckle, 46–47
- Image quality
optical transfer function of, 24–26, 45–46
Strehl definition of, 24–26
- Infrared observations, 130, 344
- Infrared speckle interferometry, see Interferometry, infrared speckle
- Infrared sources
interferometry of, 78, 80–81
molecular flows around, 274–75, 292–94, 301, 307, 309–11
- Infrared spectroscopy, 272–73
- Interferometric measurements of binary stars, 59–66
of stellar angular diameters, 76–78
- Interferometric techniques used to measure seeing, 41–42
- Interferometry
infrared speckle, 65–66, 69, 80–81
long-baseline, 63–64, 76–78, 81–82
Michelson, 60, 62–63, 77
speckle, 60–62, 64–65, 70–71, 73, 76–77
used to minimize effects of seeing, 47–50
visual, 59, 62–65, 70
- Intergalactic gas clouds, 149
- Interstellar medium
abundances in, 339–44, 348–49, 366, 373
X-ray emission from stars to, 414, 443
- IRAS observations, 130
- IRC 2, 81
- IRC+10216, 81, 108
- Iron abundance in halo stars, 227–34
- IUE observations, 93–94, 103, 124, 127, 130, 212, 415
- J**
- "Jet" in Crab Nebula, 140–42
- Jets, molecular, 267, 306–14
- Jupiter, abundances in atmosphere of, 344, 358
- K**
- K stars
activity cycles of, 389, 395–408
flare, 216, 218
- K stars, dwarf, as X-ray emitters, 418, 440
- Klemola 25, 151
- K1 16, 106–7
- L**
- Lambda Andromedae, 343, 391–93
- Langmuir waves, 170, 193–99, 203, 205–7
- Lithium
abundance in halo stars, 228–29, 237
observed abundances of, 359–67, 372–73
primordial abundance of, 328, 330–31, 336–37, 369, 372–73
- Loss-cone distribution, 184–89
- Lunar occultations, see Occultations, lunar
- L1551-IRS 5, 274, 292–94, 307, 309–11
- M**
- M stars, dwarf
activity cycles of, 389, 396
flare, 213, 216
radio emission from, 212
X-ray emission from, 418, 433–34, 440
- Magnetic fields, 170–99; see also Sun, magnetic field(s) of, and Stars, magnetic fields of
- Magnetohydrodynamics, 9, 12, 15
- Main-sequence stars, see Stars, main sequence
- Masers, electron-cyclotron, 169–71, 184–92, 210–11, 213–14, 222
- Masers, OH, 312
- Masers, water, 267, 271–72, 291–92, 312–13
- Mass-loss
in FU Orionis stars, 270
in Herbig-Haro objects, 270–71
in planetary nebulae nuclei, 106–12
in T Tauri stars, 268–69
- Mass outflows in early stellar evolution, 268–73, 291–92
- Meteors, abundances in, 347, 358, 360, 362, 366
- Mira-type stars, 79, 81
- Molecular clouds, 268, 273–74, 300–3, 308, 312–13
- Molecular gas
densities of, 287–88
hypersonic motions of cold, 273–74
masses of, 276–77, 281–85
temperatures of, 273, 282–87

- Molecular outflows, 267–317
 energetics of, 294–300
 evidence for, 291–92
 formation rate of, 300–3
 frequency of occurrence of,
 300–3
 jets in, 306–12
 origin and evolution of, 303–
 14
 structure of, 294
- Molecular outflow sources, 274–
 76, 278–81
 bipolarity of, 288–90
 luminosities of, 296–99
 masses of, 285–88
 velocity fields of, 292–93
- Mon R2, 81, 290, 292–93
- Mu Cassiopeia, 69
- MWC 349, 81
- M4 18, 106
- M15, 106
- M17S, 348–49
- M57, 92
- M82, 156
- M101, 165, 353–55
- N**
- Neutrino degeneracy, 335–37
- Neutrinos, 321–24, 331–33, 370
- New particles, 332–34
- NGC 414A&B, 155
- NGC 985, 151
- NGC 1023, 156, 159
- NGC 1291, 151
- NGC 1316, 159, 162
- NGC 1344, 159–60
- NGC 1535, 102
- NGC 2024, 81
- NGC 2071, 287–88, 292, 305
- NGC 2217, 151
- NGC 2264, 288, 360
- NGC 2392, 101
- NGC 2444–2445, 148, 151
- NGC 2685, 153–55
- NGC 2787, 159
- NGC 2793, 150
- NGC 2859, 151
- NGC 3718, 158
- NGC 3923, 160, 162
- NGC 3998, 159
- NGC 4203, 158–59
- NGC 4262, 159
- NGC 4278, 164
- NGC 4650A, 154–55
- NGC 4861, 355
- NGC 6543, 106
- NGC 7252, 159
- NGC 7662, 103
- NGC 7789, 362
- Nimbus 7 satellite, 387
- Novae, 76, 219–20, 338, 365
- Nucleon density, 370–72
- Nucleosynthesis, 135–38, 225–
 38
 in the Big Bang, 321–29
- O**
- O stars, 104–5
 as central stars of planetary
 nebulae, 104–7
 helium abundance in, 357–58
 interstellar D lines in spectra
 of, 339, 344
 radio flux from, 217
 X-ray emission from, 418–19,
 426, 433, 444–45
- OB stars, radiation-driven winds
 of, 426, 444–45
- O VI stars, 104–7
- Observatory site selection, 19–
 21, 30–31, 36–44
 optical methods for, 42–44
- Observatory sites, improvements
 to, 21, 44–51
- Occultations, lunar
 used in binary star resolution,
 60, 66–70, 72
 used to measure angular di-
 ameters, 75, 78–80
- Orion A, 348–49
- Orion association, 216
- Orion molecular cloud
 maser sources in, 272, 292
 molecular flow in, 274–75,
 282, 284, 287, 290, 292,
 300
- Orion Nebula, 81, 430
- Outer Lindblad resonances, 152–
 53
- P**
- II Pegasus, 389–90
- 12 Persei, 69
- Phi Cygni, 73
- Planetary boundary layer
 diurnal cycle in, 32–34
 effects of terrain on, 35–36
 temperature structure above,
 34–35
- Planetary nebulae, 89–117
 abundances in, 94–97, 107,
 110–11, 355–56
 central stars in, see Planetary
 nebulae nuclei
 classification of, 92, 96
 distances of, 90–91, 112
 evolution of, 90, 94–97, 107–
 12
 radio emission from, 94
 radius-expansion-velocity rela-
 tion in, 93
 spectrophotometry of, 93–97
 structures of, 91–93
- Planetary nebulae nuclei
 evolution of, 107–12
 luminosities of, 104
 magnitudes of, 98–100
 mass loss in, 106–12
 spectral classification of, 104–
 7
 temperatures of, 100–4
 winds in, 106, 108
- Plasma radiation, 192–99, 206–
 7, 213–14, 222
- Pleiades
 flare stars in, 216
 luminosity variation in stars
 in, 394–95
 lithium abundance of stars in,
 360–61
 X-ray emission of stars in,
 430, 432–33, 440
- Plerions, 120
- Polarization, radio emission and,
 171–74, 176, 180, 183,
 188, 197–98
 solar, 200–10
 stellar, 213–16, 218–19, 221
- Population I stars, lithium
 abundance in, 359–62, 364–
 69, 373
- Population II stars, lithium
 abundance in, 337, 363–67,
 369, 372–73
- Præsepe cluster, 360, 408
- Pre-main-sequence stars, see
 Stars, pre-main-sequence
- Ps 1 (K648), 96, 106
- Pulsar in Crab Nebula, 119–20,
 124, 134–38, 141
- R**
- Radio emission, 169–224
 from planetary nebulae, 94
 solar, 169, 199–211, 222
 stellar, 169, 211–22
- Radio emission mechanisms,
 170–99
- bremssstrahlung, 169–70, 174–
 76, 202, 209–10, 217
- electron-cyclotron masers,
 169–71, 184–92, 210–11,
 213–14, 222
- gyroresonance, 176–78, 202
- gyrosynchrotron emission,
 170, 172–74, 176–84,
 206, 210, 213, 219–220,
 222
- plasma radiation, 192–99,
 206–7, 213–14, 222
- Radio observations
 of Crab Nebula, 119–20, 139–
 41
- of L1551-IRS 5, 309–10
- of T Tauri stars, 269

- Rho Ophiuchi dark cloud, 301, 430
- Rho Persei, 78
- Rigel (B Orionis), 77
- RS Canum Venaticorum stars
activity cycles of, 379–80,
387–94, 407, 409, 429
- radio emission from, 217–19
- X-ray emission from, 419,
427, 429
- S**
- Seeing, 19–57
effects of turbulence on, 26–
36
- interferometers used to
minimize effects of, 47–
50
- interferometric measurements
of, 41–42
- meteorology of, 26–36
- microthermal approach in
evaluating, 36–40, 44
- observatory site selection,
19–21, 30–31, 36–44
- optical methods for measuring,
40–44
- optics of, 21–26
- scintillation measurements in
evaluating, 40–41
- wavelength dependence of, 26
- Seeing conditions, ameliorating,
45–51
- Sirius (α Canis Majoris), 77
- Skylab, 255, 414, 416, 422–23
- Small Magellanic Cloud, 353
- Solar bursts, 192, 195, 198–200
microwave, 209–11
types of, 202–9
- Solar corona, 200, 202, 420–24,
436, 438
- Solar coronal holes, 200–2, 421,
436
- Solar coronal loops, 422–23,
438
- Solar dynamo, 9, 250–51, 381–
83, 439–40
- Solar flares, 191, 202, 206–7,
209–10, 240, 242–45, 262–
63
- Solar Maximum Mission, 251,
255, 258, 387–88
- Solar system, abundances in,
344, 347–50, 358, 362,
366–67
- Solar telescopes, seeing con-
ditions and, 45
- Solar wind, 252, 347–48, 436
- Space Telescope, 64
- Speckle holography, 66
- Speckle imaging, 46–47
- Speckle interferometry, see In-
terferometry, speckle
- Speckle masking, 66
- Standard hot Big Bang model,
see Big Bang model of the
Universe
- Star formation, 150–51, 162,
216–17, 273–74, 300–3,
313–14, 414, 430–31, 443
- Stars
A-type, see A stars
abundances in, 225–38, 337–
39, 350, 357–69, 372–73
activity cycles of, 379–412;
see also Stars, surface
activity of
dynamo models for, 404–
8
fluctuations in, 386–409
angular diameters of, 74–81
interferometric measure-
ments of, 76–78
occultation measurements
of, 78–80
- B-type, see B stars
- binary, see Binary stars
- cataclysmic variable, 220–22
- chromospheric emission of,
384–86
- chromospheric variations in,
395–408
- cool, 75, 341–44, 436; see
also late-type stars
- coronae of, see Stellar coronae
- dwarf halo, 228–36
- early-type, X-ray emission
from, 419, 425–27, 433–
34, 438, 444–45
- F-type, see F stars
- G-type, see G stars
- giant
activity cycles of, 402, 408
angular diameters of, 75–81
halo, 229–31, 234–37
red, lithium abundance in,
359, 362, 365–67
- K-type, see K stars
- late-type
flares in, 216
radio emission from, 212–
13
- X-ray emission from, 417–
19, 422, 424–25, 427–
29, 431–41, 445
- M-type, see M stars
- magnetic activity in, 414–31
- magnetic fields in, 13, 170–
99, 216–17, 220–21,
380, 382–85, 439
- main-sequence
activity cycles of, 380, 382,
384–85, 396–408
angular diameters of, 76
chromospheric variations in,
395–408
- continuum variations in,
394–95
- lithium abundances in, 338,
360–61, 363
- rotation of, 384–86, 397–
408
- mass-loss in, 217, 268–71,
413
- masses of, 60–62, 69–74, 82
- nonradial oscillations of, 10
- O-type, see O stars
- pre-main-sequence
abundances in, 301, 337–
38, 359–61, 363–64
- X-ray emission from, 419,
430–31, 446
- radio emission from, 211–22
- rotation of, 380, 382, 384–86,
388–94, 397–409, 427–
29, 434, 438–41
- supergiant, 76–80, 418, 436,
445
- surface activity of, 413–17,
420–25
- dynamo models for, 439–40
- X-ray emission from, 413–52
- Starspots, 389–95
- Stellar coronae, 212–13, 217,
423–25, 434–39
- Stellar dynamos, 404–7, 439–41
- Stellar evolution, 94–97, 107–
12, 216–17, 225–38, 267–
76, 300–2, 313–14, 430–33
- Stellar flares, 191, 213–16, 218–
22, 443, 447
- Stellar interiors, 4–8
- Stellar models, 5, 7–8
- Stellar stability, 8
- Stellar structure, 5–6
- Stellar winds, 106, 217, 267–72,
302–6, 312, 425–26, 430,
436, 443, 445
- Sun**
abundances in, 344, 358,
366
- activity cycle of, 380–83
- corona of, see Solar corona
- faculae in, 251, 386–88
- filaments in, 243–45
- global flows in, 240, 249–51
- global oscillations of, 240,
252–53, 259–60
- luminosity variations of, 240,
251–52, 262, 387–88
- magnetic cycle of, 240, 245–
51, 262
- magnetic field(s) of, 4–5, 8–9,
12–13, 239–66, 379–83,
415, 422–24, 439–40
- magnetic flux in, 245–50,
262–63
- radio emission from, 169,
199–211, 222

- surface activity of, 414–16, 420–25, 444
 X-ray emission from, 209, 413–16, 419–25, 436, 444
 variability of, 423–24
S
 Sunspot cycle, 12–13, 380–81, 386–88
Sunspots, 239–66, 379–82
 bipolar feature of, 240, 242–43
 Evershed flow in, 257
 fine-scale structure of, 254–58, 262
 dots, 257–58, 260, 262
 fibrils, 240, 245, 255–58, 262
 grains, 257–58, 262
 magnetic fields of, 8–9, 12
 Maunder minimum of, 252, 381
 oscillations in, 253, 258–62
 penumbral of, 243, 254–58, 261–62
 penumbral waves in, 261–62
 rotation of, 250–51
 theory of, 8–9
 umbrae of, 242, 254–60
Supernova event in Crab Nebula, 134–39
Supernova remnant, Crab Nebula as, 119–49
Supernovae, 226–27, 232, 235
Synchrotron radiation, 169, 176–77, 182–83
S140, 288–89
T
T Sagittarius, 362
T Tauri, 66, 269
T Tauri stars
 flares in, 216
 jets in, 306, 308
 lithium abundance in, 359–60
 mass outflow from, 268–69, 275, 301
 radio observations of, 269
 winds from, 268–71, 306, 430
X-ray emission from, 430
Tarantula nebula, 71
Tau Persei, 69
Turbulence, 27–32, 60
 effects of terrain on, 35–36
 small-scale, 27–28
U
UGC 1449, 151
UGC 3730, 151
UGC 7576, 154–55
Ultraviolet observations
 of **Crab Nebula**, 123–24, 127, 130–31
 of **planetary nebulae**, 93, 95, 103
Universe
 Big Bang model of, see **Big Bang model of Universe**
 expansion of
 anisotropic, 334
 speed-up, 370
 geometry of, 332
 inhomogeneous models of, 335
 neutrino degeneracy in, 335
Ursa Major cluster, 430
UV Ceti, 212–13
UX Arietis, 218
V
VB 8, 73
Vela object, 150
VLA observations, 66, 150, 209, 213, 216, 222, 415
VLBI observations, 218, 272, 312
Voyager I observations, 344, 358
Vy 22, 108
V1057 Cygni, 270
V1500 Cygni, 76
V1515 Cygni, 270
W
W Ursae Majoris stars, 419
Wave propagation, 21–26
Wavelength dependence of seeing, 26
White dwarfs, 107, 110–11, 219–22
Wolf-Rayet stars, 63, 72, 76, 104–7
W3 IRS-5, 81, 348–49
W43, 348–49
W49, 348–49
W51, 348–49
XYZ
Xi Cephei, 74
X-ray background, diffuse soft, 441–43
X-ray emission
 from early-type stars, 425–28, 433–34, 438, 444–45
 from late-type stars, 418–25, 431, 433–36, 438, 445–46
 solar, 209, 413–16, 419–25, 436, 444
 variability of, 423–24
 from very young stars, 430–31, 443, 446
X-ray emission, stellar, 413–52
 and diffuse soft X-ray background, 441–43
 and effective gravity, 434–37
 and the interstellar medium, 443
 and spectral type, 433–34
 and stellar age, 430–33
 and stellar rotation, 428–29, 438–41
X-ray emission, transient, 431, 447
X-ray source, **Crab Nebula** as, 119–20, 122–23, 139–40
Young stellar objects, mass outflows from, 267–314
YY Orionis stars, 269
Zeta Aquarii, 66
Zeta Ophiuchi, 362
Zeta Puppis, 77
MISCELLANEOUS
II Hz 4, 150
I Zw 18, 353, 355
II Zw 40, 353
II Zw 70, 353
II Zw 73, 154
VII Zw 466, 150

